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FOREST INSECT SURVEY

Sawfly and Spittlebug Damage in Pine Plantations on the Nicolet National Forest - 1950

by

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FOREST INSECT SURVEY

SAWFLY AND SPITTLEBUG DAMAGE IN PINE PLANTATIONS ON THE NICOLET NATIONAL FOREST - 1950

INTRODUCTION

Approximately 5,000 acres of pine plantations, which had been treated to control the red-headed pine sawfly, Neodiprion lecontei (Fitch), and the Saratoga spittlebug, Aphrophora saratogensis (Fitch), were examined by the Milwaukee Laboratory during the fall of 1949. The area surveyed is comprised of plantations selected as representative of those in which DDT sprays had been applied, since the inception of the use of this insecticide in 1946. The purpose of the survey was to determine the status of sawfly and spittlebug damage in the treated plantations. From data obtained in this and subsequent surveys it is anticipated some conclusions may be drawn on the length of protection that may be expected in pine plantations through the use of properly timed insecticides.

In the fall of 1950 the plantations sampled in 1949 were resurveyed by the author during the period between September 25 and October 4. In view of the fact that a sizeable addition to the acreage sprayed on the Nicolet National Forest accrued as a result of extensive control work carried on during this last season, it was necessary to add to the areas previously surveyed twelve more sample plantations, bringing to a total of 58 the number examined. The results of the survey are summarized below:

METHODS AND PROCEDURES

The survey technique used in this year's work was essentially the same as that previously employed by Gallun (1949), although some minor innovations in procedure were tried. Among these were classification of the degree of current flagging, and estimation of feeding puncture density on sample trees. Current flagging on the sample plots was characterized as none, light (less than 50 percent), medium (more than 50 percent), and heavy (100 percent). The density of feeding punctures per 6-inch slice on the twigs was classified as none (0), light (1 - 10), and heavy (more than 10).

Plantation maps and overlays prepared last year were used again in 1950 for resurveying the majority of the plots. The total number of plots covered in the survey was 256, of which 44 were newly established in plantations in the Lakewood District, which were sprayed for the first time this year. In all, 4,750 pine trees were examined for spittlebug injury, and 1,144 for red-headed pine sawfly injury, during the course of this work.

RESULTS

The records of spittlebug and sawfly injury obtained in the survey have been summarized and are presented in Tables 1 to 3. The basic data from which these summaries were prepared are included in the appendix (Table 1 - 5). The more important results of the survey as evidenced by the data are as follows:

1. For the Forest as a whole, 51 percent of the red pine trees in plantations that have been sprayed to control the Saratoga spittlebug were currently flagged (i.e. 1950 flagging). Only 4 percent of the jack pine in treated plantations were similarly injured.

2. Current flagging in red pine plantations that have not been treated averaged only 10 percent. No records were taken in unsprayed jack pine plantations.

3. Current flagging in the treated red pine plantations occurred more frequently in the Lakewood District than in either the Eagle River or the Leona Districts. In the Lakewood plantations (excepting those sprayed in 1948) between 50 and 62 percent of the trees were flagged in 1950. In the other two Districts the greatest amount of current flagging in sprayed red pine areas was 17 and 30 percent respectively.

4. Current flagging in the untreated red pine plantations that were examined as check areas was also greatest on the Lakewood District; being 32 percent as compared with 3 percent or less on each of the other two Districts.

5. In addition to the high incidence of occurrence of current flagging on the Lakewood plantations, the degree of flagging on the individual tree was much more severe there than elsewhere. An average of 58 percent of the red pine trees examined contained injury of this type. Of this amount 3 percent were completely flagged, 15 percent possessed flags on half or more of the twigs, and 40 percent on half or less of the twigs. In some plantations as high as 8 percent of the trees were completely flagged, and an additional 25 percent flagged to the extent of half or more of the twigs.

6. Damage prior to 1950, as expressed by the number of trees with old flags, was much greater for jack pine (34 percent) than for red pine (14 percent).

7. In all cases but one, the number of red pine trees containing spittlebug eggs was much smaller in plantations that have been sprayed (average 7 percent) than in untreated check plantations (average 42 percent). The exception is the area sprayed in 1948 on the Eagle River District where 52 percent of the trees were found to contain eggs at the time of the present survey.

TABLE 1. SUMMARY OF SPITTLEBUG DAMAGE AND EGG DEPOSITION IN PINE PLANTATIONS ON THE RICCLET NATIONAL FOREST - 1950

Spray Year	Host	No. of Trees Examined	Trees with Flags: Current (percent)	Trees with Flags: Past (percent)	Trees with 1950 Feeding Injury: Light (percent)	Trees with 1950 Feeding Injury: Heavy (percent)	Trees with Eggs (percent)
			LAKEWOOD DISTRICT - SPRAYED AREAS				
1946	Red pine	306	82	18	9	3	5
	Jack pine	358	0	9	42	3	-
1947	Red pine	334	77	11	13	19	24
	Jack pine	364	14	31	44	11	-
1948	Red pine	176	18	27	-	-	0
1949	Red pine	220	75	23	-	-	1
1950	Red pine	1056	50	7	-	-	1
All Years	Red pine	2092	59	12	11	11	0.5
	Jack pine	722	7	20	43	7	-
			LAKEWOOD DISTRICT - UNSPRAYED AREAS				
	Red pine	176	32	5	44	54	73
			EAGLE RIVER DISTRICT - SPRAYED AREAS				
1947	Red pine	215	17	23	-	-	7
	Jack pine	641	2	46	-	-	-
1948	Red pine	85	9	26	76	5	52
	Jack pine	3	33	33	33	0	-
All Years	Red pine	300	15	24	-	-	18
	Jack pine	844	2	45	-	-	-
			EAGLE RIVER DISTRICT - UNSPRAYED AREAS				
	Red pine	264	0.4	1	55	1	31
			LAONA DISTRICT - SPRAYED AREAS				
1949	Red pine	176	30	22	-	-	10
			LAONA DISTRICT - UNSPRAYED AREAS				
	Red pine	176	3	3	35	19	27

TABLE 1 (continued). SUMMARY OF SPITTLEBUG DAMAGE AND EGG DEPOSITION IN PINE PLANTATIONS ON THE HIAWATHA NATIONAL FOREST - 1950

Spray Year	Host	No. of Trees Examined	Trees with Flags: Current (percent)	Trees with Flags: Past (percent)	Trees with 1950 Feeding Injury: Light (percent)	Trees with 1950 Feeding Injury: Heavy (percent)	Trees with Eggs (percent)
			ALL DISTRICTS - SPRAYED AREAS				
1946	Red pine	306	82	18	9	3	5
	Jack pine	358	0	9	42	3	-
1947	Red pine	549	54	16	-	-	17
	Jack pine	1205	5	48	-	-	-
1948	Red pine	261	13	26	-	-	17
	Jack pine	3	33	33	33	0	-
1949	Red pine	396	55	22	-	-	1
1950	Red pine	1056	50	7	-	-	1
All Years	Red pine	2568	51	14	-	-	7
	Jack pine	1566	4	34	-	-	-
			ALL DISTRICTS - UNSPRAYED AREAS				
	Red pine	616	10	3	46	21	42

TABLE 2. DEGREE OF CURRENT FLAGGING IN PLANTATIONS INJURED BY THE SARATOGA SPITTLEBUG IN 1950 - NICOLET NATIONAL FOREST

Ranger District	Spray Year	Host	No. Trees Examined	Percent with Current Flagging: Light	Medium	Heavy	Total
Lakewood	1946	Red pine	306	48	25	8	81
		Jack pine	358	0	0	0	0
	1947	Red pine	134	63	13	2	78
		Jack pine	364	14	0	0	14
	1948	Red pine	176	14	1	0	15
	1949	Red pine	220	42	25	8	75
	1950	Red pine	1056	35	13	2	50
	All years	Red pine	2092	40	15	3	58
		Jack pine	722	7	0	0	7
	Unsprayed	Red pine	176	31	2	0	33
Eagle River	1947	Red pine	215	17	0	0	17
		Jack pine	841	2	0	0	2
	1948	Red pine	85	9	0	0	9
		Jack pine	3	33	0	0	33
	All years	Red pine	300	15	0	0	15
		Jack pine	844	2	0	0	2
	Unsprayed	Red pine	264	0.4	0	0	0.4
Laona	1949	Red pine	176	30	0	0	30
	Unsprayed	Red pine	176	2	1	0	3
All Districts	1946	Red pine	306	48	25	8	81
		Jack pine	358	0	0	0	0
	1947	Red pine	549	45	8	1	54
		Jack pine	1205	5	0	0	5
	1948	Red pine	261	12	1	0	13
		Jack pine	3	33	0	0	33
	1949	Red pine	396	36	14	5	55
	1950	Red pine	1056	35	13	2	50
	All years	Red pine	2568	37	12	2	51
		Jack pine	1566	4	0	0	4
	Unsprayed	Red pine	616	9	1	0	10

TABLE 3. SUMMARY OF CURRENT AND PAST SAWFLY DAMAGE ON SPRAYED RED PINE PLANTATIONS NICOLET NATIONAL FOREST - 1950

District	Spray Year	No. Trees Examined	Percent with 1950 Feeding Injury	Percent with Past Feeding Injury
Laona	1947	132	1	14
	1948	132	5	22
	All Years	264	3	18
Lakewood	1947	88	6	8
	1948	616	13	36
	1949	176	7	36
	All Years	880	11	34
All Districts	1947	220	3	12
	1948	748	12	34
	1949	176	7	36
	All Years	1144	9	30

8. The incidence of red-headed pine sawfly damage was low; in all cases considerably lower than that found in the 1949 survey. An average of 9 percent of all trees examined for red-headed pine sawfly damage showed evidence of current injury in the present survey as compared with 17 percent a year ago.

9. From the data gathered this year, there was no evident relationship between the degree of infestation and the number of years that have elapsed since spraying, for either the spittlebug or the sawfly. Among the sample plantations selected in 1949 as representative of areas where the spittlebug had been controlled by sprays, 21 out of 36 examined in 1950 had been resprayed this year.

DISCUSSION

The Saratoga spittlebug was present in epidemic numbers on the Nicolet National Forest in 1950, while the red-headed pine sawfly continued to be endemic. The results of the 1950 survey show the relation of the spittlebug to the red-headed pine sawfly to correspond to that found in 1949, but the relative difference in abundance was much more pronounced. It is apparent now that the spittlebug feeding puncture counts and egg deposition records made in 1949 were both indicative of the presence of the high population that actually put in its appearance in the early summer of 1950. Failure to recognize this fact was largely due to the low incidence of current flagging in the fall of 1949. The survey at that time showed that less than 1 percent of the trees were currently flagged, but the survey made one year later showed that more than 51 percent of the trees in the same areas were flagged. It does not appear that

the amount of flagging is necessarily indicative of the population that may be present.

It is difficult to cite specific figures for the amount of damage caused by the spittlebug on the Nicolet. Reference to the data for red pine on the Lakewood District shows that in the 1946 and 1948 sample plantations 25 percent of the trees were over half flagged and that an additional 8 percent were completely flagged. Trees in the latter category may be counted as dead, and it is likely that some of those flagged by more than half will succumb. In general, however, the damage was much less in most other plantations. When a general increase in thespittlebug population is taking place, it does not appear that the treatment of small units surrounded by infested areas is technically sound. Evidence in support of this observation is found in the fact that numerous areas previously sprayed to control the spittlebug required respraying in 1950 to prevent further damage.

In 1951 it is anticipated that the red-headed pine sawfly will continue in endemic status on the Forest. Plantations that were sprayed in 1947, 1948, and 1949 on the Lakewood District had the highest incidence of sawfly feeding injury in 1950. This was not serious, and is not considered likely to be serious during the 1951 season. The Saratoga spittlebug may prove to be troublesome in localized areas, but in plantations that have been sprayed in no case does the present survey show as high an incidence of egg deposition as was found in 1949. 1950 feeding puncture data is incomplete, but in general it, too, reflects a much smaller amount of adult activity than was shown by last year's data. These findings are both believed to be a direct result of the extensive spraying program conducted during the season. It is likely that the spraying of some areas will prove to be necessary in 1951, but it is not believed that a need will develop for further work on the scale of that carried out in 1950.

Results of these surveys thus far have failed to show a consistent trend for the duration of the effectiveness of sprays. On the other hand, there is some evidence of the existence of certain relationships that may help markedly in improving survey procedures. For example, the incidence of trees carrying an egg population in the fall seems to be correlated with the incidence of flagging that subsequently develops. There is also evidence that the severity of feeding puncture injury, and of flagging, on the individual trees increases as the intensity of the infestation increases. It is possible that this knowledge may be useful in simplifying pre-control survey procedures.

REFERENCES

Gallun, Robert L., 1949. Post-spray survey of sawfly and spittlebug damage in pine plantations on the Nicolet National Forest. Forest Insect Lab., Milwaukee, Wis., Nov. 16, 1949 (mn. report).

APPENDIX

TABLE 1. POST-SPRAY SURVEY OF SAWFLY AND SPITTLEBUG DAMAGE ON THE NICOLET NATIONAL FOREST. LOCATION OF ADDITIONAL SAMPLE PLOTTES ESTABLISHED ON LAKEWOOD DISTRICT IN 1950.*

Sample Plantation	Township	Range	Section
47	31 N	17 E	SE/SW - 21
48	31 N	17 E	NE/NE - 29
49	31 N	15 E	SW/SW - 24
50	31 N	15 E	NW/NW - 16
51	31 N	15 E	NE/SW - 34
52	31 N	15 E	NW/SE - 33
53	31 N	15 E	SE/SW - 22
54	31 N	15 E	SW/NE - 23
55	31 N	15 E	NE/SE - 15
56	31 N	15 E	NE/SW - 14
57	31 N	15 E	NW/SW - 2
58	31 N	15 E	SE/NW - 12

* Locations of sample forties established in 1949 are listed in a previous report (Gallun, 1949).

APPENDIX

TABLE 2. SUMMARY OF SPITTLEBUG DAMAGE ON SAMPLE PLOTTES, HIGGLET NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Ranger District	Plantation No.	Tree Species	Tree No.	No. Trees with 1950 Feeding Punctures: None	Light	Heavy	No. Trees Flagged: None	Past	Current: Light	Medium	Heavy	No. Trees with Egg Deposits
1946	Lakewood	20	Red pine	1	0	1	0	1	0	0	6	0	0
"	"	24 a & b	" "	44	Sprayed in 1950			2	11	25	14	3	1
"	"	24 c & d	" "	44	" " "				1	20	16	7	0
"	"	38	" "	88	" " "			8	30	54	25		3
"	"	39	" "	88	" " "			7	8	43	23	15	0
"	"	40	" "	17	0	10	7	12	2	3	0	0	8
"	"	41	" "	24	5	17	2	17	2	3	0	0	4
			Total	306	5	28	9	47	54	148	78	25	16
"	"	19	Jack pine	88	64	24	0	86	2	0	0	0	
"	"	20	" "	87	48	36	3	84	3	0	0	0	
"	"	21	" "	88	35	48	5	68	20	0	0	0	
"	"	40	" "	31	18	13	0	28	3	0	0	0	
"	"	41	" "	64	35	28	1	61	3	0	0	0	
			Total	358	200	144	9	327	31	0	0	0	
1947	Eagle River	3	Red pine	2	Sprayed in 1950			0	2	1	0	0	0
"	" "	4	" "	31	" " "			18	10	4	0	0	0
"	" "	5	" "	40	" " "			13	21	9	0	0	1
"	" "	6	" "	20	" " "			16	2	2	0	0	0
"	" "	7	" "	88	" " "			66	4	18	0	0	2
"	" "	8	" "	17	" " "			16	1	0	0	0	4
"	" "	10	" "	12	6	6		0	9	3	0	0	5
"	" "	11	" "	5	1	4		4	1		0	0	2
			Total	215	7	10		133	50	37	0	0	14

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APPENDIX

TABLE 2 (continued). SUMMARY OF SPITTLEBUG DAMAGE ON SAMPLE PORTIONS, NICOLET NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Ranger District	Planta-tion No.	Tree Species	Tree No.	No. Trees with 1950 Feeding Punctures: None	Light	Heavy	No. Trees Flagged: None	Past	Current: Light	Medium	Heavy	No. Trees with Egg Deposit
1947	Eagle River	1	Jack pine	88	Sprayed in 1950			62	26	0	0	0	
"	" "	2	" "	88	" " "			10	77	1	0	0	
"	" "	3	" "	86	" " "			46	40	0	0	0	
"	" "	4	" "	57	" " "			12	44	2	0	0	
"	" "	5	" "	48	" " "			8	39	1	0	0	
"	" "	6	" "	68	" " "			54	14	0	0	0	
"	" "	8	" "	71	" " "			63	5	3	0	0	
"	" "	9	" "	88	79	9	0	55	33	2	0	0	
"	" "	10	" "	76	60	16	0	33	43	0	0	0	
"	" "	11	" "	83	38	43	2	36	47	0	0	0	
"	" "	12	" "	88	65	23		72	15	4	0	0	
			Total	801	242	91	2	451	363	13	0	0	
"	Lakewood	22	Red pine	67	Sprayed in 1950			18	15	55	14	1	15
"	"	23	" "	50	" " "			3	3	24	20	3	3
"	"	25	" "	88	" " "			13	16	75	0	0	4
"	"	42	" "	20	2	10	8	14	0	6	0	0	10
"	"	44	" "	88	1	32	55	27	4	50	8	2	47
"	"	45	" "	1	0	0	1	1	0	0	0	0	1
			Total	334	3	42	64	76	38	210	42	6	80
"	"	22	Jack pine	1	Sprayed in 1950			0	1	0	0	0	
"	"	23	" "	38	" " "			13	25	0	0	0	
"	"	42	" "	62	9	43	10	60	0	2	0	0	
"	"	43	" "	88	14	57	17	40	35	25	0	0	
"	"	45	" "	67	29	48	10	30	40	23	0	0	
"	"	46	" "	80	74	11	3	76	12	2	0	0	
			Total	364	126	159	40	219	113	52	0	0	

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TABLE 2 (continued). SUMMARY OF SPITTLEBUG DAMAGE ON SAMPLE PORTIONS, KLAMATH NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Ranger District	Plantation No.	Tree Species	Tree No.	No. Trees with 1950 Feeding Punctures: None	Light	Heavy	No. Trees Flagged: None	Past: Light	Current: Light	Medium	Heavy	No. Trees with Egg Deposit
1948	Eagle River	13	Red pine	85	16	65	4	59	22	8	0	0	44
"	" "	13	Jack pine	3	2	1	0	1	1	1	0	0	
"	Lakewood	33	Red pine	88	Sprayed in 1950			40	31	14	1	0	0
"	"	34	" "	88	" " "			62	16	11	0	0	0
			Total	176				102	47	25	1	0	0
1949	Laona	16	Red pine	88	Sprayed in 1950			43	9	13	0	0	17
"	"	18	" "	88	" " "			45	30	9	0	0	1
			Total	176				88	39	52	0	0	18
"	Lakewood	35	Red pine	88	Sprayed in 1950			40	32	34	14	2	0
"	"	36 a & b	" "	44	" " "			39	3	8	18	15	1
"	"	37	" "	88	" " "			12	15	50	23		1
			Total	220				91	50	92	55	17	2
1950	Lakewood	47	Red pine	88	Sprayed in 1950			27	3	39	16	6	1
"	"	48	" "	88	" " "			36	0	39	10	3	1
"	"	49	" "	88	" " "			57	8	28	1	2	0
"	"	50	" "	88	" " "			64	7	24	2	0	1
"	"	51	" "	88	" " "			83	1	4	0	0	0
"	"	52	" "	88	" " "			84	2	2	0	0	0
"	"	53	" "	88	" " "			73	0	15	0	0	9
"	"	54	" "	88	" " "			5	7	50	29	4	1
"	"	55	" "	88	" " "			13	3	48	26	1	0
"	"	56	" "	88	" " "			10	20	46	27	5	1
"	"	57	" "	88	" " "			27	11	34	23	4	1
"	"	58	" "	88	" " "			50	9	38	0	0	0
			Total	1936				529	71	367	134	25	15

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TABLE 3. SUMMARY OF SPITTLEBUG DAMAGE ON SAMPLE PORTIES - HIGGLET NATIONAL FOREST - NON-SPRAYED AREAS - 1950

Ranger Districts	Plantation No.	Tree Species	Tree No.	No. Trees with 1950 Feeding Punctures: None	Light	Heavy	No. Trees Flagged: None	Past	Current: Light	Medium	Heavy	No. Trees with Egg Deposits
Eagle River	1	Red pine	88	31	56	1	85	2	1	0	0	24
" "	2	" "	88	60	28	0	88	0	0	0	0	24
" "	3	" "	88	27	60	1	87	1	0	0	0	35
		Totals	264	118	144	2	260	3	1	0	0	83
Laona	4	Red pine	88	3	52	33	77	6	5	1	0	46
"	5	" "	44	44	0	0	0	0	0	0	0	0
"	6	" "	44	33	10	1	44	0	0	0	0	1
		Totals	176	80	62	34	121	6	5	1	0	47
Lakewood	7	Red pine	88	4	42	42	70	6	14	0	0	59
"	8	" "	88	0	35	53	44	3	40	3	0	70
"	9			Sprayed in 1950								
"	10			" " "								
		Totals	176	4	77	95	114	9	54	3	0	129
Total all Districts		Red pine	616	202	283	131	495	18	60	4	0	259

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TABLE 4. SUMMARY OF SPITTLEBUG DAMAGE IN YEAR OF TREATMENT - HIOCLET NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Ranger District	Tree Species	Tree No.	No. Trees with 1950 Feeding Punctures: None	Light	Heavy	No. Trees Flagged: None	Past	Current: Light	Medium	Heavy	No. Trees with Egg Deposits
1946	Eagle River			Not Sprayed								
"	Laona			" "								
"	Lakewood	Red pine	306	5	28	9	47	54	148	78	25	16
"	"	Jack pine	358	200	149	9	327	31	0	0	0	
1947	Eagle River	Red pine	215				133	50	37	0	0	14
"	" "	Jack pine	841	242	91	2	451	383	9	0	0	
"	Laona			Not Sprayed								
"	Lakewood	Red pine	334	3	42	64	76	38	210	42	6	80
"	"	Jack pine	361	126	159	40	219	113	52	9	0	
1948	Eagle River	Red pine	85	16	65	4	59	22	8	0	0	14
"	" "	Jack pine	3	2	1	0	1	1	1	0	0	
"	Laona			Not Sprayed								
"	Lakewood	Red pine	176	Sprayed in 1950			102	47	25	1	0	0
1949	Eagle River			Not Sprayed								
"	Laona	Red pine	176	Sprayed in 1950			88	39	52	0	0	18
"	Lakewood	" "	220	" " "			91	50	92	55	17	2
1950	Lakewood	Red pine	1056	Sprayed in 1950			529	71	367	134	25	15
	All Districts	Red pine	2568				1125	371	939	310	73	189
		Jack pine	1966				998	528	66	0	0	

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TABLE 5. SUMMARY OF SAWFLY DAMAGE ON SAMPLE PORTIES - NICOLET NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Ranger Districts	Plantation No.	Tree Species	Tree No.	Trees with 1950 Feeding No.	Trees with 1950 Feeding Percent	Trees with Past Feeding No.	Trees with Past Feeding Percent
1947	Laona	14-a	Red pine	22	0	0	2	9
"	"	15-a-b-c	" "	66	1	2	9	14
"	"	17-c-d	" "	44	0	0	8	18
			Total	132	1	1	19	14
"	Lakewood	25	Red pine	88	5	6	7	8
1948	Laona	14-b-c	Red pine	44	2	4	8	18
"	"	14-d	" "	22	0	0	6	27
"	"	15-d	" "	22	2	9	8	36
"	"	17-a	" "	22	2	9	5	23
"	"	17-b	" "	22	1	4	1	4
			Total	132	7	5	29	22
"	Lakewood	26	Red pine	88	9	10	39	44
"	"	27	" "	88	12	14	16	18
"	"	28	" "	88	16	18	27	31
"	"	29	" "	88	14	16	39	44
"	"	30	" "	88	18	20	39	44
"	"	31	" "	88	11	12	40	45
"	"	32	" "	88	1	1	24	27
			Total	616	81	13	224	36
1949	Lakewood	31	Red pine	88	11	12	40	45
"	"	32	" "	88	1	1	24	27
			Total	176	12	7	64	36

(NOT FOR PUBLICATION)

FOREST INSECT SURVEY

SAWFLY AND SPITTLEBUG DAMAGE IN PINE PLANTATIONS ON THE CHEQUAMEGON NATIONAL FOREST - 1950

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INTRODUCTION

In the fall of 1949 the Milwaukee Laboratory conducted a survey of pine plantations on the Chequamegon National Forest that had been sprayed to control the red-headed pine sawfly, Neodiprion lecontei (Fitch), and the Saratoga spittlebug, Aphrophora saratogensis (Fitch). Included in this survey were all plantations in which control measures had been taken against these insects since the inception of the use of DDT in 1946. The purpose of this survey was to determine how well the treatments that had been applied previously were holding up, and to provide data on the length of protection that may be expected in pine plantations through the use of properly timed insecticides.

In 1950 it was deemed advisable to repeat the survey conducted in 1949, re-examining plots in the same plantations examined during the previous year, to determine the status of damage. The field phases of this work were completed by the author during the period between September 15 and 24. The results of the survey are summarized in the following paragraphs.

METHODS AND PROCEDURES

The survey technique is described by Gallun and Eaton (1949) and need not be repeated here. With one exception, the methods and procedures used in the 1950 survey were the same as those employed in 1949. The difference in this year's work was in the recording of the presence or absence of eggs on red pine in areas where Saratoga spittlebug damage was observed. These records were omitted in the 1949 survey. Plantation maps and overlays prepared last year were used again in 1950 to assist in correctly locating the stands to be surveyed and the plots therein. A total of 371 plots, on which 7,634 trees were examined for sawfly injury and 528 trees for spittlebug injury and egg deposition, were revisited in the course of this work.

RESULTS

The records of spittlebug and sawfly injury accumulated during the survey have been summarized and are presented in Tables 1 and 2 respectively.

TABLE 1. SUMMARY OF SPITTLEBUG DAMAGE AND EGG DEPOSITION IN RED PINE PLANTATIONS PARK FALLS DISTRICT, CHEQUAMEGON NATIONAL FOREST

Treatment	No. of Trees Examined	Trees with Flags: Current (percent)	Trees with Flags: Past (percent)	Trees with 1950 Feeding Punctures: Light (percent)	Trees with 1950 Feeding Punctures: Heavy (percent)	Trees with Eggs (percent)
Sprayed (1949)	308	0	36	49	19	28
Unsprayed	220	1	4	48	11	22

TABLE 2. SUMMARY OF CURRENT AND PAST SAWFLY DAMAGE BY RANGER DISTRICTS - CHEQUAMEGON NATIONAL FOREST - SPRAYED AREAS - 1950

Spray Year	Species	PARK FALLS		HAYWARD		GLIDDEN		WASHBURN		ALL DISTRICTS	
		PERCENT OF TREES WITH FEEDING INJURY									
		Current	Past	Current	Past	Current	Past	Current	Past	Current	Past
1946	Red Pine	9	85							9	85
1947	Red Pine	2	21	18	22	3	4			4	19
1947	Jack Pine	0	3	18	24					3	6
1948	Red Pine	1	17	8	19					7	19
1949	Red Pine	1	14	4	14	1	6			3	12
1949	Jack Pine			3	32			8	30	7	30
All Years	Red Pine	2	23	8	17	2	5			5	17
	Jack Pine	0	3	10	28			8	30	5	18
NON-SPRAYED AREAS*											
	Red Pine	0	9	1	6	1	9			1	8

* Records taken on red pine only.

The major findings evident from this work are as follows:

1. In red pine plantations sprayed to control the spittlebug, 49 percent of the trees bore light feeding injury (1 to 10 punctures per 6-inch cut) and 19 percent heavy feeding injury (more than 10 punctures per 6-inch cut). In non-sprayed plantations 48 percent of the trees bore light feeding injury and 11 percent heavy feeding injury.

2. Twenty-eight percent of the trees in the sprayed areas contained spittlebug eggs, while in the non-sprayed areas 22 percent contained eggs.

3. Flagging due to spittlebug feeding in both sprayed and unsprayed areas was practically negligible. In both areas the number of flagged trees was less than 1 percent of the total number examined.

4. The amount of current sawfly injury in pine plantations was generally low throughout the Forest as a whole. The injury was most prevalent on the Hayward District where 10 percent of the jack pine and 8 percent of the red pine examined were partly defoliated.

5. Sawfly injury for all treated red pine plantations, irrespective of year of spraying, occurred on 5 percent of the trees. In unsprayed plantations only 1 percent of the trees were injured. However, even at the present low population level the frequency of sawfly injury varied according to the length of time since control measures were applied. Damage was most common in the plantations treated four years ago, and least in plantations treated last year.

6. The known preference of the red-headed pine sawfly for jack pine over red pine was not indicated by the 1950 survey data. Both hosts suffered the same degree of injury (5 percent) according to the records.

DISCUSSION

A comparison of the results of the 1950 survey with those obtained in 1949 shows no great change in the status of the Saratoga spittlebug, but a very marked reduction in the activities of the red-headed pine sawfly. The survey data suggest that spittlebug activity in previously sprayed plantations may have been slightly less in 1950 than it was in 1949, for 68 percent of the trees showed feeding injury this year in contrast to 80 percent last year. Forty-nine of the 68 percent with feeding punctures this year were placed in the light injury category, and the remaining 19 percent in the heavy category. Last year 42 of the 80 percent with feeding punctures were classified as light, and 38 percent as heavy. It is interesting to note that, even though 38 percent of the trees had heavy feeding injury in 1949, only one tree was flagged in 1950. In the unsprayed areas sampled the number of trees with heavy feeding

injury was about the same (11 - 12 percent) this year as last, but the number with light injury increased from 24 percent in 1949 to 48 in 1950. The finding of feeding puncture injury in the sprayed area this year in about the same numbers as last year suggests that the control work carried on in 1949 was not particularly successful. The lack of success may have been due either to faulty application of the sprays, or, more likely, the lateness in timing which permitted the adults to lay a considerable number of their eggs before succumbing to the insecticide.

Sawfly damage in 1950 in previously sprayed areas was lower in all plantations, and in most stands very much lower than in 1949. In 1950 only 5 percent of the red pine and 5 percent of the jack pine was damaged by this year's larvae, whereas in 1949 current damage was 14 and 21 percent respectively for the two hosts.

In general, insect activity in plantations on the Chequamegon National Forest in 1950 was of such minor nature that very little control work was necessary. The unanticipated decline in red-headed pine sawfly populations may have been a result of the unusually wet and cool season this year. Development of this insect was greatly delayed, and it is doubtful if some of the larvae were able to attain full growth before the end of the season. A few third and fourth instar larvae were still feeding during the first week of October when the survey was made. To a lesser extent, the season may have been similarly detrimental to the Saratoga spittlebug. It is not considered likely that red-headed pine sawfly populations will increase markedly on this Forest in 1951; but it is probable that the Saratoga spittlebug will continue to cause damage in the few localized areas where it now occurs.

REFERENCE

Callun, Robert L. and Charles B. Eaton, 1949. Post-spray Survey of Sawfly and Spittlebug Damage in Pine Plantations on the Chequamegon National Forest - 1949. Forest Insect Laboratory, Milwaukee, Wisconsin (office report).

APPENDIX

TABLE 1. SUMMARY OF SAWFLY DAMAGE ON SAMPLE PLANTATION - SPRAYED AREAS - CHEQUAMEGON NATIONAL FOREST - 1950

Spray Year	Ranger District	Plantation Number	Tree		Trees with 1950 Feeding		Trees with Past Feeding	
			Species	Number	Number	Percent	Number	Percent
1946	Park Falls	4	Red Pine	88	8	9	75	85
1947	Park Falls	2	Red Pine	462	4	1	62	13
"	" "	3	" "	484	2	-	108	22
"	" "	4	" "	88	8	1	75	85
"	" "	8	" "	132	-	-	6	4
"	" "	9	" "	44	-	-	4	9
"	" "	10	" "	44	-	-	18	41
"	" "	12	" "	198	10	5	42	21
"	" "	13	" "	198	-	-	36	18
			Total	1,650	24	2	351	21
1947	Park Falls	1	Jack Pine	242	-	-	10	4
"	" "	11	" "	320	1	-	8	2
			Total	562	1	-	18	3
1947	Gliddon	32	Red Pine	308	8	3	11	4
1947	Hayward	26	Red Pine	308	53	17	69	22
"	"	28	" "	110	22	20	22	20
			Total	418	75	18	91	22
1947	Hayward	22	Jack Pine	88	16	18	21	24
1948	Park Falls	5	Red Pine	154	4	3	31	20
"	" "	7	" "	132	-	-	18	13.6
			Total	286	4	1	49	17
1918	Hayward	20	Red Pine	176	-	-	3	2
"	"	24	" "	220	18	8	50	23
"	"	25	" "	308	15	5	71	23
"	"	26	" "	308	53	17	69	22
			Total	1,012	86	8	193	19

APPENDIX

TABLE 1 - (continued)

Spray Year	Ranger District	Plantation Number	Tree Species	Tree Number	Trees with 1950 Feeding Number	Trees with 1950 Feeding Percent	Trees with Past Feeding Number	Trees with Past Feeding Percent
1949	Park Falls	6	Red Pine	88	1	1.1	12	13.6
1949	Glidden	29	Red Pine	286	1	.3	14	4.9
"	"	30	" "	396	6	1.5	28	7.1
			Total	682	7	1.0	42	6.2
"	Hayward	18	Red Pine	308	11	3.6	43	14.0
"	"	19	" "	198	6	3.0	6	3.0
"	"	20	" "	176	-	-	3	1.7
"	"	29	" "	220	18	8.2	50	22.7
"	"	25	" "	308	15	4.9	71	23.1
			Total	1,210	50	4.1	173	14.3
1949	Hayward	21	Jack Pine	110	3	2.7	35	31.8
"	Washburn	16	Jack Pine	352	40	11.4	150	42.6
"	"	17	" "	220	6	2.7	21	9.5
			Total	572	46	8.0	171	29.9

APPENDIX

TABLE 2. TOTAL SAWFLY DAMAGE BY YEARS OF SPRAYING AND RANGER DISTRICTS - CHEQUAMEGON NATIONAL FOREST - 1950

Spray Year	Ranger District	Tree		Trees with 1950 Feeding		Trees with Past Feeding	
		Species	Number	Number	Percent	Number	Percent
1946	Park Falls	Red Pine	88	8	9	75	85
"	Glidden			Not Sprayed			
"	Hayward			"			
"	Washburn			"			
1947	Park Falls	Red Pine	1,650	24	2	351	21
"	" "	Jack Pine	562	1	-	18	3
"	Glidden	Red Pine	308	8	3	11	4
"	Hayward	" "	418	75	18	91	22
"	"	Jack Pine	88	16	18	21	24
"	Washburn			Not Sprayed			
1948	Park Falls	Red Pine	286	4	1	49	17
"	Glidden			Not Sprayed			
"	Hayward	Red Pine	1,012	86	8	193	19
"	Washburn			Not Sprayed			
1949	Park Falls	Red Pine	88	1	1	12	14
"	Glidden	" "	682	7	1	42	6
"	Hayward	" "	1,210	50	4	173	14
"	"	Jack Pine	110	3	3	35	32
"	Washburn	" "	572	46	8	171	30
Total Districts		Red Pine	5,742	263	5	997	17
Total Districts		Jack Pine	1,332	66	5	245	18

APPENDIX

TABLE 3. SUMMARY OF SAWFLY DAMAGE ON SAMPLE PLANTATIONS - NON-SPRAYED AREAS - CHEQUAMEGON NATIONAL FOREST - 1950

Ranger District	Plantation Number	Tree		Trees with 1950 Feeding		Trees with Past Feeding	
		Species	Number	Number	Percent	Number	Percent
Park Falls	34	Red Pine	220	-	-	38	17
" "	35	" "	132	-	-	-	-
" "	36	" "	88	-	-	-	-
		Total	440	-	-	38	9
Glidden	37	Red Pine	264	6	2	29	11
"	38	" "	176	1	1	6	3
"	39	" "	176	-	-	23	13
		Total	616	7	1	58	9
Hayward	40	Red Pine	176	1	1	8	4
"	41	" "	220	-	-	4	2
"	42	" "	110	2	2	4	4
"	43	" "	88	3	3	20	23
		Total	594	6	1	36	6
Total All Districts		Red Pine	1,650	13	1	132	8

APPENDIX

TABLE 4. SUMMARY OF SPITTLEBUG DAMAGE AND EGG DEPOSITION - PARK FALLS DISTRICT - CHEQUAMEGON NATIONAL FOREST - 1950

Treatment	Planta-tion Number	Tree Species	Tree Number	1950 Feeding Light Number	Light Percent	Heavy Number	Heavy Percent	Flagging Past Number	Past Percent	Current Number	Current Percent	Trees with Eggs Number	Eggs Percent
Sprayed Areas	14	Red Pine	220	110	50	34	16	69	31			54	24
	33	" "	88	42	48	25	28	42	48	1	1	33	38
Total	-	" "	308	152	49	59	19	111	36	1	-	87	28
Non-Sprayed	35	Red Pine	132	64	48	8	6	8	6	-	-	23	17
	36	" "	88	42	48	17	19	1	1	2	2	25	28
Total	-	" "	220	106	48	25	11	9	4	2	1	48	22